Research Note No. 21

GRAZING INVESTIGATIONS AT POINT SPRINGS AREA IN SOUTHERN IDAHO

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The University of Idaho, the Bureau of Land Management and a group of livestock producers from Malta, Idaho, are participating in a cooperative grazing study on the Point Springs Experimental Area ten miles east of Malta, Idaho.

The objectives of the study reported on in this paper are to determine the optimum level of grazing by season of use and to determine the amount of livestock production associated with each season and level of use, (light, medium and heavy, spring or fall).

Plans for the study were developed jointly by the cooperators. The Bureau of Land Management fenced the area, furnished corral facilities, developed water for the experimental cattle and provided technical assistance. The livestock producers supply the animals used in the grazing investigations and assist in the handling and marking of these animals. Personnel of the University are responsible for the experimental design and collection and analysis of the data. These data include the determination of forage production, utilization, growth rates, changes in stand density of the various species from year to year, soil moisture, livestock weights and grade, precipitation and temperature on the area. In addition, the University furnishes the scale for weighing the livestock, electrical power for pumping water for the livestock and a submersible pump for the well.

The experimental area was seeded to crested wheatgrass (Agropyron desertorum and A. cristatum) in the fall of 1952. Prior to seeding, this depleted range had a cover consisting primarily of big sagebrush (Artemisia tridentata) with some rabbitbrush (Chrysothamnus viscidiflorus) and a scattering of herbaceous plants. The latter consisted primarily of Sandberg's bluegrass (Poa secunda), squirreltail grass (Sitanion hystrix), halogeton (Halogeton glomeratus) and annual mustards.

The pasture area is located on a large alluvial fan that radiates out from the Sublett mountain range to the east. The slope is to the west and ranges from 1 to 2 percent in the experimental area. Parent material of the weakly developed soil is alluvium. The surface soil material is low in organic matter, loose and friable with a slight accumulation of sodium and calcium from plant residues. Sodium percentages become high at twelve inches and increase with increasing depths. The soil reaction is

*The data presented in this research note are part of the research to be presented by the senior author as part of the requirements for a Ph.D. degree in Range Management at Oregon State University.

alkaline throughout. Moisture penetration is generally limited to a depth of 18 to 24 inches.

Climatic conditions at the experimental site are typical of the valley areas of southern Idaho, northern Utah and northern Nevada. Much of the moisture comes as winter snow or early spring rains. The summers are generally dry but thunderstorms are not uncommon during this period. Low humidities and high temperatures with considerable wind characterize the late spring and summer period. The mean annual precipitation at the Malta Ranger Station, ten miles to the west, is 8.7 inches and approximately 9 inches at Strevell, Idaho which is located some 20 miles to the southwest of the experimental area. The Point Springs seeding is at an elevation of approximately 4,900 feet; 300 feet higher than Malta. On this account and the fact that the pastures are located just west of the Sublett range of mountains, precipitation may be slightly greater here than at the two stations mentioned.

Six 160 acre pastures were fenced in the fall of 1954 in the northeast corner of a 7,000 acre seeded area. Evaluation of the vegetation and animal response to three intensities of grazing (light, moderate and heavy) in two seasons (spring and fall) was started in the spring of 1955. Three pastures were used in the spring, one at each intensity, and three separate ones in the fall. In 1960, prior to the grazing season, each pasture was cross fenced to make twelve 80 acre pastures. The treatments described above were maintained on one-half of each original pasture and the other one-half received an additional seasonal treatment. All combinations of spring and fall use at the three intensities, except any combination of fall use with heavy spring use, were initiated as part of the study in the spring of 1960. The results of the four years of combined seasonal use treatments will not be reported here.

EXPERIMENTAL PROCEDURE

Each pasture was sampled before grazing to determine production and stand density of the seeded species, and the numbers of other plants. The pastures were sampled in a similar manner after grazing so as to determine utilization.

The spring grazing period extended from approximately the first of May to the middle of June. The period of fall grazing has varied over the years. It extended from October 15 to November 30 the first year, from approximately October first to the middle of November the next three years and from September 15 to the first part of November in the last five years. The fall grazing periods have been moved to the earlier dates due primarily to difficulties arising from the freezing of the water system in the late fall.

The animals are weighed and graded at the beginning of the trial, weighed at the end of 28 days, and weighed and graded at the end of the 45 day grazing period. Prior to weighing, the animals

are held in the corral overnight without feed and water. A proportionate number from each of the owners is assigned to each pasture.

RESULTS

Vegetational Changes

Production on the pastures has varied widely during the 9 years of study, being as much as five times greater in the best than in the poorest year (table 1). The greatest variation has occurred in the moderate- and heavy-use pastures in both seasons of use. This is partly due to grazing pressure and partly to differences in stand density at the beginning of the study. The light-use pastures had a greater stand density at the beginning than either the moderate or heavy use pastures. Carry-over of forage from one year to the next also reduced yearly variability and this carry-over was greatest in the light-use pastures.

Table 1. Utilization and average production for pastures grazed at three intensities in two seasons, spring and fall, 1955 through 1963

Season	Intensity	Average Production	Range	Utilization	Range
		Pounds per acre		Percent	
Spring	Light	677	373 1003	48	28 78
	Moderate	588	230 980	62	26
	Heavy	568	294 940	71	47 87
Fall	Light	669	412 1044	49	34 73
	Moderate	606	240 1244	56	24 86
	Heavy	484	186 937	64	27 87

Desired utilization levels have been difficult to obtain. Highly variable production, lack of flexibility in animal numbers, variations in animal behavior and a lack of clairvoyance to predict growing conditions during the spring of the year are some of the reasons for this difficulty. Deviations from the desired rates have been mainly in the direction of less utilization than was planned. Grazing in the spring starts about the time that active plant growth

is getting underway. As a result, utilization falls short of that desired if growing conditions are extremely favorable and use may be greater than desired, if conditions are unfavorable. Cold weather and water difficulties in the first two years caused disruption in grazing patterns in some of the pastures. It was found that as the forage supply diminished, consumption also diminished and the anticipated quantity of forage was not consumed.

Stand density of the crested wheatgrass has shown a general improvement in all pastures during the 9 years of study (Figures 1 and 2). When the study started, the crested wheatgrass stand was thinner and less uniform in some parts of the pasture area than in others. Reasonably good growing conditions in 1955 and 1956 produced some improvement. Favorable growing conditions in 1957 caused a marked improvement in stand density and distribution of crested wheatgrass. This improvement occurred in 1958 in the fall-use pastures and in 1959 in the spring-use pastures. Seed produced in 1955 and 1956 germinated in abundance in the fall-use pastures in 1957 and the young plants were well established that fall. These were counted as seedlings in 1957 and as established plants in 1958. Seedlings from the 1955 and 1956 seed crops did not survive to any extent in the spring-use pastures, and it was the seed from the 1957 crop that germinated in 1958 and became established plants in 1959. Unfavorable climatic conditions in 1960 and 1961 caused a reduction in stand density in all pastures so that an all time low, except for the initial year, was reached in 1962. April and the first part of May in 1962, were dry but moisture conditions improved greatly during the last part of May and early June. The greatest amount of precipitation for the April-May-June period of any of the 9 years of the study occurred in 1963, and stand density showed an increase over 1962. It is doubtful, however, whether the stand density achieved in 1958 and 1959 can be maintained under average growing conditions in this area.

Improved distribution of crested wheatgrass in the pastures contributed to the general increase in plants per unit area during the study period. The cover of sparsely vegetated spots thickened and bare spaces were invaded by the seeded species. Frequency of occurrence in the sample plots is shown in Figures 3 and 4. These data were obtained from one square-foot plots sampled in 1955, 1956, 1957, 1959 and 1963. Frequency of crested wheatgrass plants in all pastures increased from less than 70 percent in 1955 to more than 90 percent in 1959. The extremely dry years of 1960 and 1961 caused a decrease in the uniformity of distribution as shown in the 1963 counts but frequency was still in excess of 80 percent. The effect of grazing intensity on frequency of occurrence has not been large through 1963, although the light-use pastures show a more uniform distribution of crested wheatgrass in 1963 than the pastures used at heavier rates.

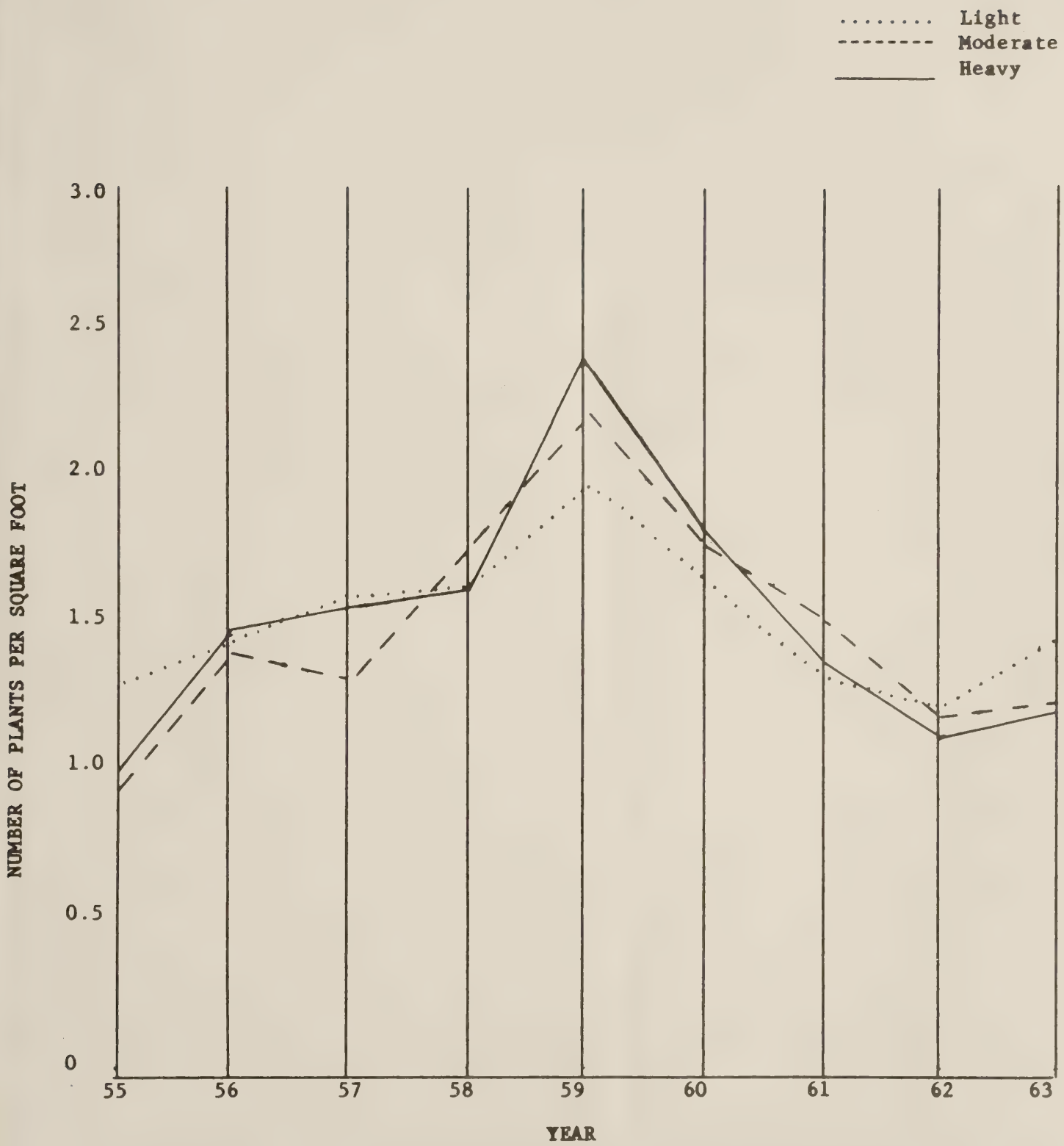

Figure 1. Number of mature crested wheat grass plants per square-foot of surface area in the pastures grazed at three intensities during the spring season.

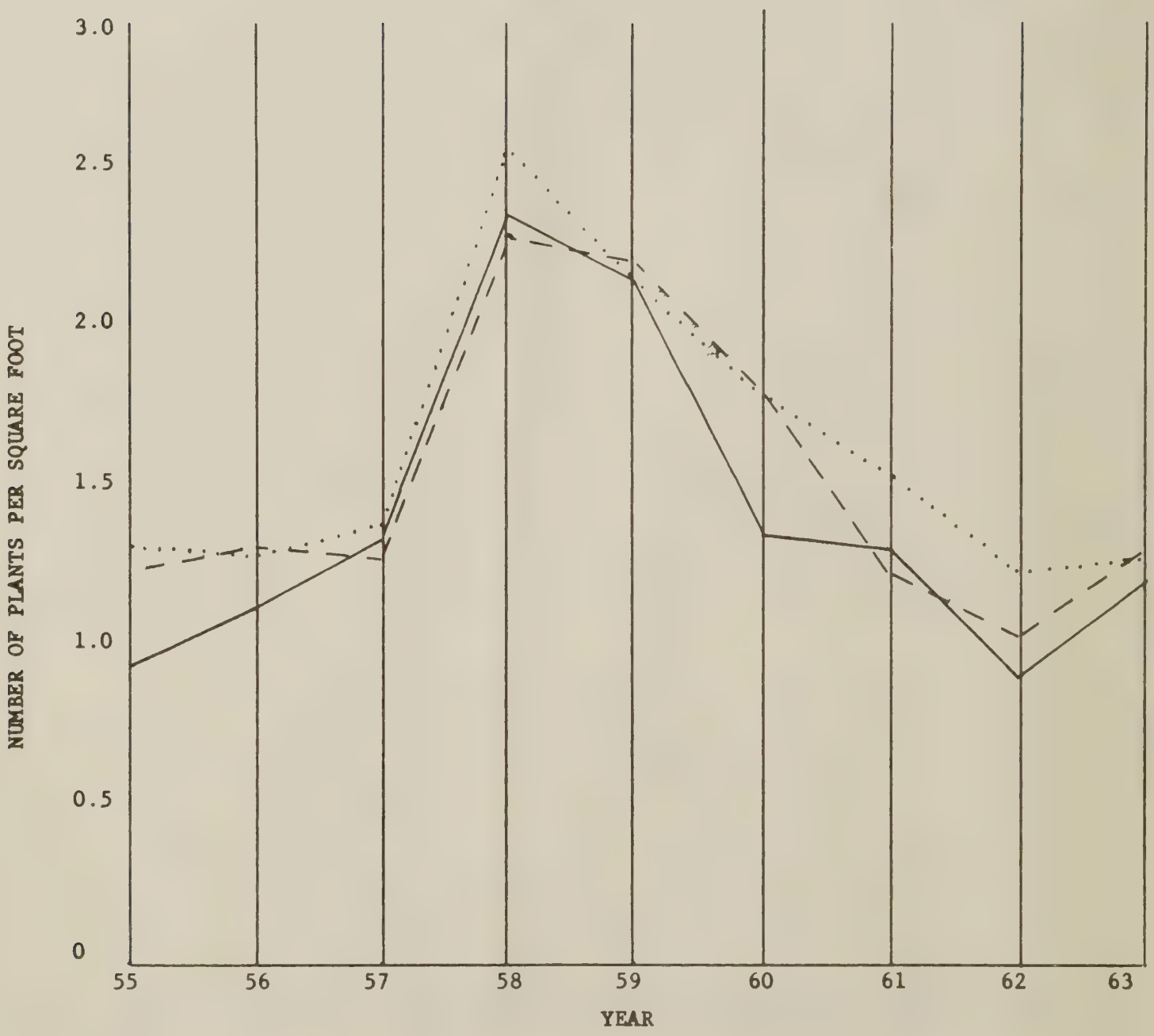

Figure 2. Number of mature crested wheatgrass plants per square-foot of surface area in the pastures grazed at three intensities during the fall season.

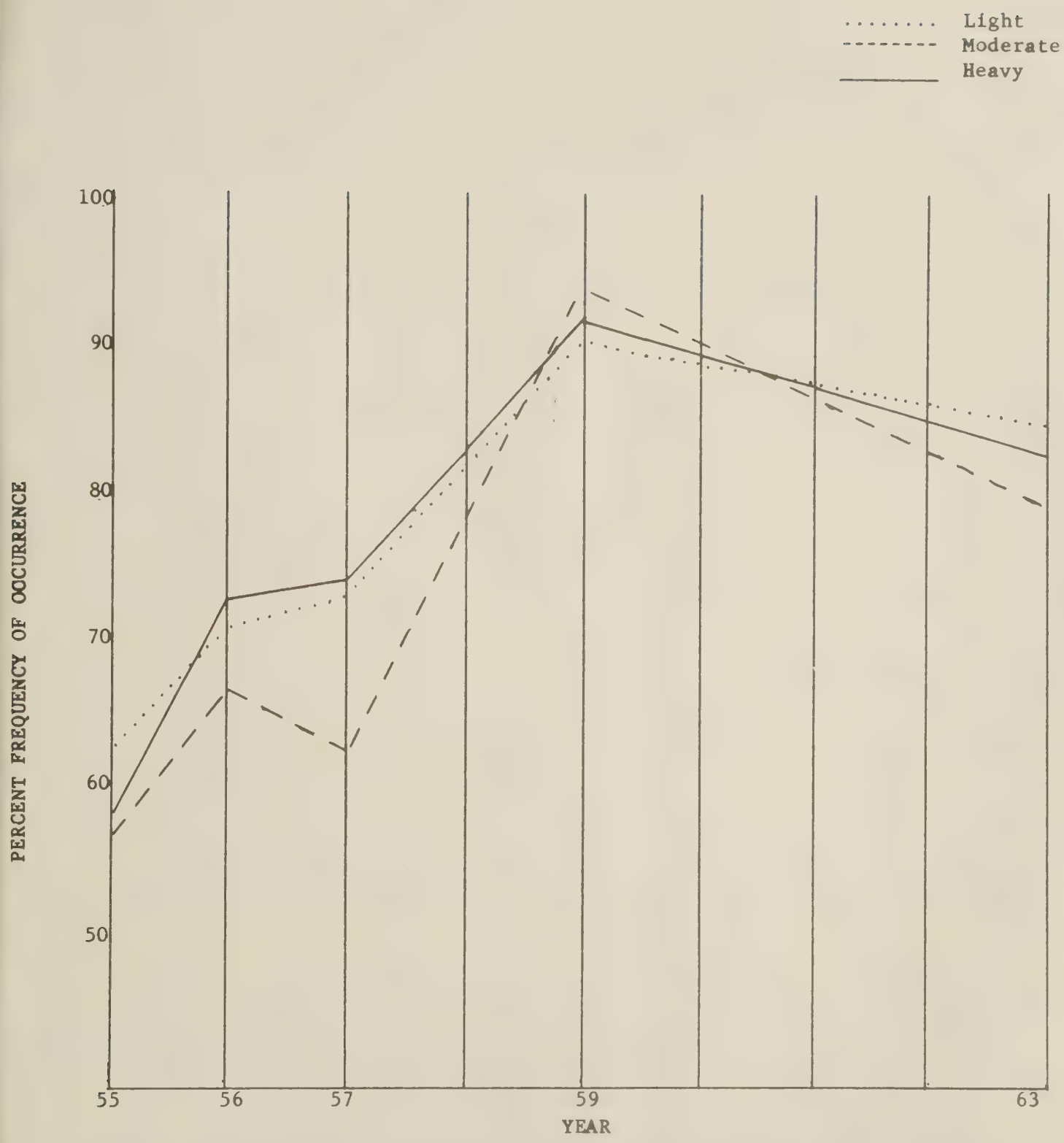

Figure 3. Frequency of occurrence of mature crested wheatgrass in the sample plots taken in the pastures grazed at three intensities during the spring.

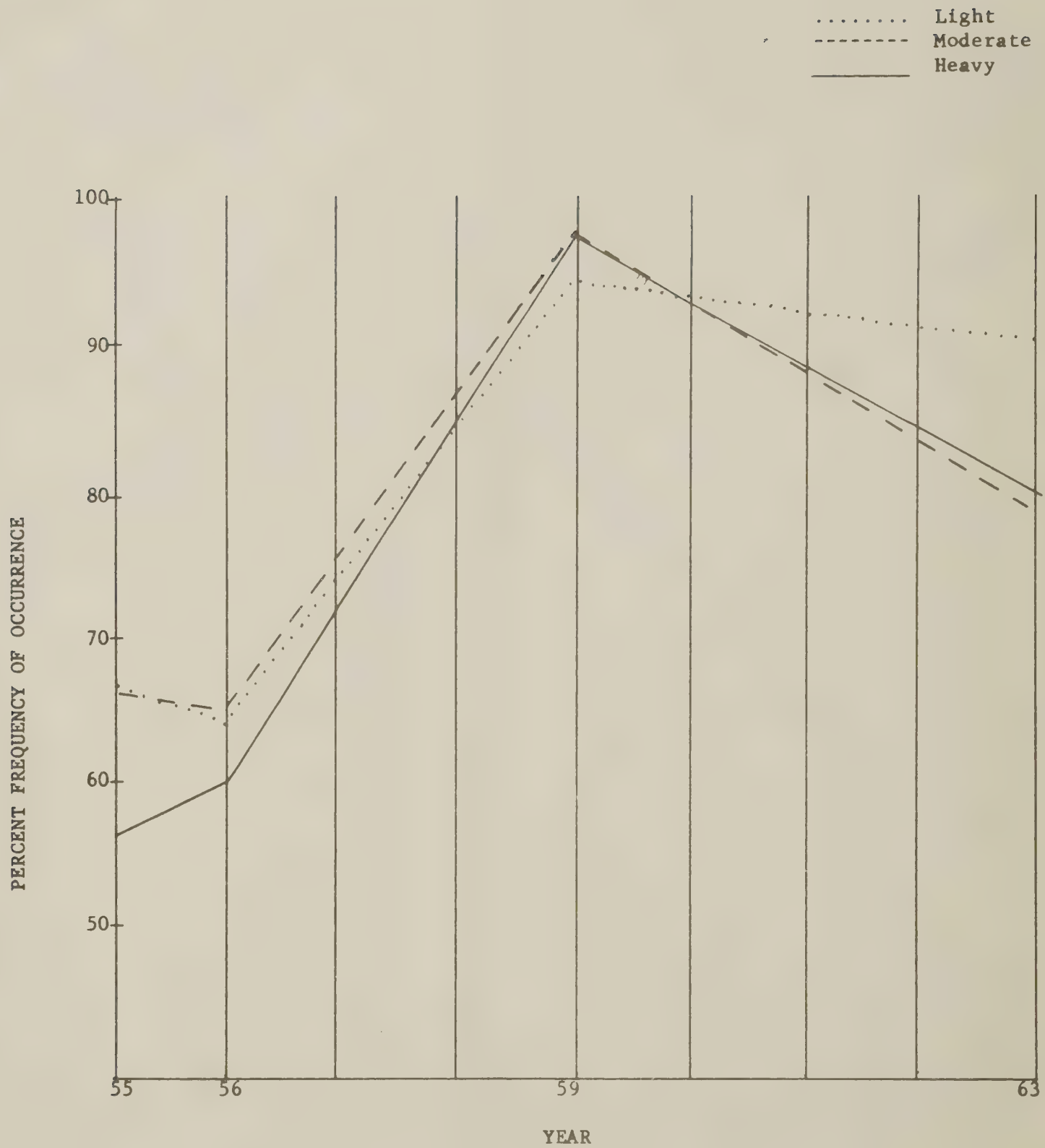

Figure 4. Frequency of occurrence of mature crested wheatgrass in the sample plots taken in the pastures grazed at three intensities during the fall.

Animal Response

Stocking rates for each pasture were judged according to the production or anticipated production in each year. Yearling animals were desired for the trials but it was not possible to obtain this age class at all times. The animals used in the spring ranged in weight from 378 to 520 pounds and averaged between 430 and 447 pounds over the 9 year period. The average weight of animals grazed in the fall was 160 to 174 pounds heavier than those used in the spring (table 2).

Table 2. Average animal weights, total gains, daily gains and gains per acre in pounds for three intensities and two seasons of grazing for the period 1955-1963

Season	Intensity of Use	Initial Weight Avg.	Initial Weight 1/ Range	Total Gain per Animal Avg.	Total Gain per Animal 1/ Range	Daily Gain per Animal Avg.	Daily Gain per Animal 1/ Range	Gain per Acre Avg.	Gain per Acre Range
Spring	Light	447	378 520	106	65 160	2.22	1.42 2.87	40	23 69
	Moderate	444	397 520	102	56 169	2.12	1.22 2.58	44	26 71
	Heavy	430	387 500	99	70 147	2.07	1.60 2.69	51	33 77
Fall	Light	604	566 628	30	0.8 62.2	0.67	0.02 1.21	13	0.2 28.0
	Moderate	603	542 651	30	2.9 60.0	0.67	0.06 1.18	14	0.6 25.0
	Heavy	591	555 667	28	4.4 45.0	0.62	0.09 1.08	16	1.2 38.0

1/ These values are the range in average weights and gains over the 9 years of study and not of individual animals.

Gains in the spring of the year averaged between 99 and 106 pounds per animal for the nine years. During the 1963 season, the pastures were grazed for an additional 39 days and the gain per animal ranged between 147 and 169 pounds for this longer period. Fall gains have been less as would be expected on dry feed, and have averaged between 28 and 30 pounds per animal. Average gain per day has been in excess of two pounds in the spring and approximately two-thirds of a pound in the fall. Gain per animal and average daily gain has been greatest in the light-use pastures and least in the heavy-use pastures in both seasons. Gains per animal and gain per day increased in the fall when the season was moved to an earlier

date. Green growth during the fall period in 1959 and 1961 produced gains in excess of 1 pound per day.

Average gain per acre ranged between 40 and 51 pounds in the spring and between 13 and 16 pounds in the fall. Greatest gain per acre was obtained on the heavy-use pasture both spring and fall.

Table 3. Average number of acres per animal month for three intensities of use in two seasons, 1955-1963

Season	Intensity	Acres Per Animal Month	
		Average	Range
Spring	Light	1.8	0.8 2.8
	Moderate	1.6	0.8 2.5
	Heavy	1.3	0.8 1.7
Fall	Light	1.8	0.9 2.9
	Moderate	1.8	0.7 3.0
	Heavy	1.6	0.7 3.6

DISCUSSION

Climatic conditions during the spring of the year appear to have been the dominant factor in producing variations in stand density of the seeded species, and in the amount of annual plants and their distribution in the pastures. There has not been any material change in the density of woody species found in any of the pastures during the nine years of study. Big sagebrush and rabbitbrush, however, have increased in size over this period.

After nine years of grazing, the heavy-use pastures are still producing satisfactory livestock gains. From the standpoint of gain per acre, this intensity of use has been the most productive. The desired level of use, however, has been obtained only in the last six years in the spring grazed pasture and in five of the last six in the fall grazed one. Furthermore, certain changes are taking place in the heavy spring-use pasture that indicate possible lower livestock production in the future. There are a greater number of dead crested wheatgrass plants here than in the light or moderately used pastures and plants with less than full crowns show a greater

frequency. Annual plants, especially halogeton, are more abundant, and are distributed more widely over the pasture area. Forage production per acre is proportionately less at the end of nine years than in the other pastures.

Heavy fall use as yet does not appear to be detrimental to the seeded stand and production was maintained through the ninth year of the study.

Light use of crested wheatgrass, spring or fall, does not appear to be desirable for maximum sustained livestock production. Although individual animal gains are slightly greater than under the other intensities of use, they are not sufficiently better to offset the greater gain per acre achieved at the moderate and heavy intensities. Under light use, grazing is patchy with the grazed patches receiving fairly heavy use while parts of the pasture remain ungrazed. The yearly accumulation of dry material in the ungrazed plants causes them to be even less desirable to the animals in subsequent years and thus they do not contribute their share to livestock production.